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SAMPLING PLAN FOR

ST. JULIENS CREEK ANNEX

CHESAPEAKE CITY, VIRGINIA

January 25, 1999

Prepared For:

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SAMPLING PLAN

St. Juliens Creek Annex
Chesapeake City, Virginia

TDD No.: 04-9901101
Contract No.: 68-S5-3002

1.0 INTRODUCTION

Tetra Tech EM Inc. (Tetra Tech) was assigned by the U.S. Environmental Protection Agency (EPA) to prepare an off-site sampling plan for a site inspection (SI) at the St. Juliens Creek Annex Facility, under EPA contract 68-S5-3002, Technical Directive Document (TDD) 04-9901101. The purpose of the sampling plan is to identify additional sample locations, samples, and sample analysis needed to complete an evaluation of the facility under the Hazard Ranking System (HRS) and determine the need for additional investigation under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 and the Superfund Amendments and Reauthorization Act of 1986 (SARA).

2.0 SITE DESCRIPTION

2.1 Location

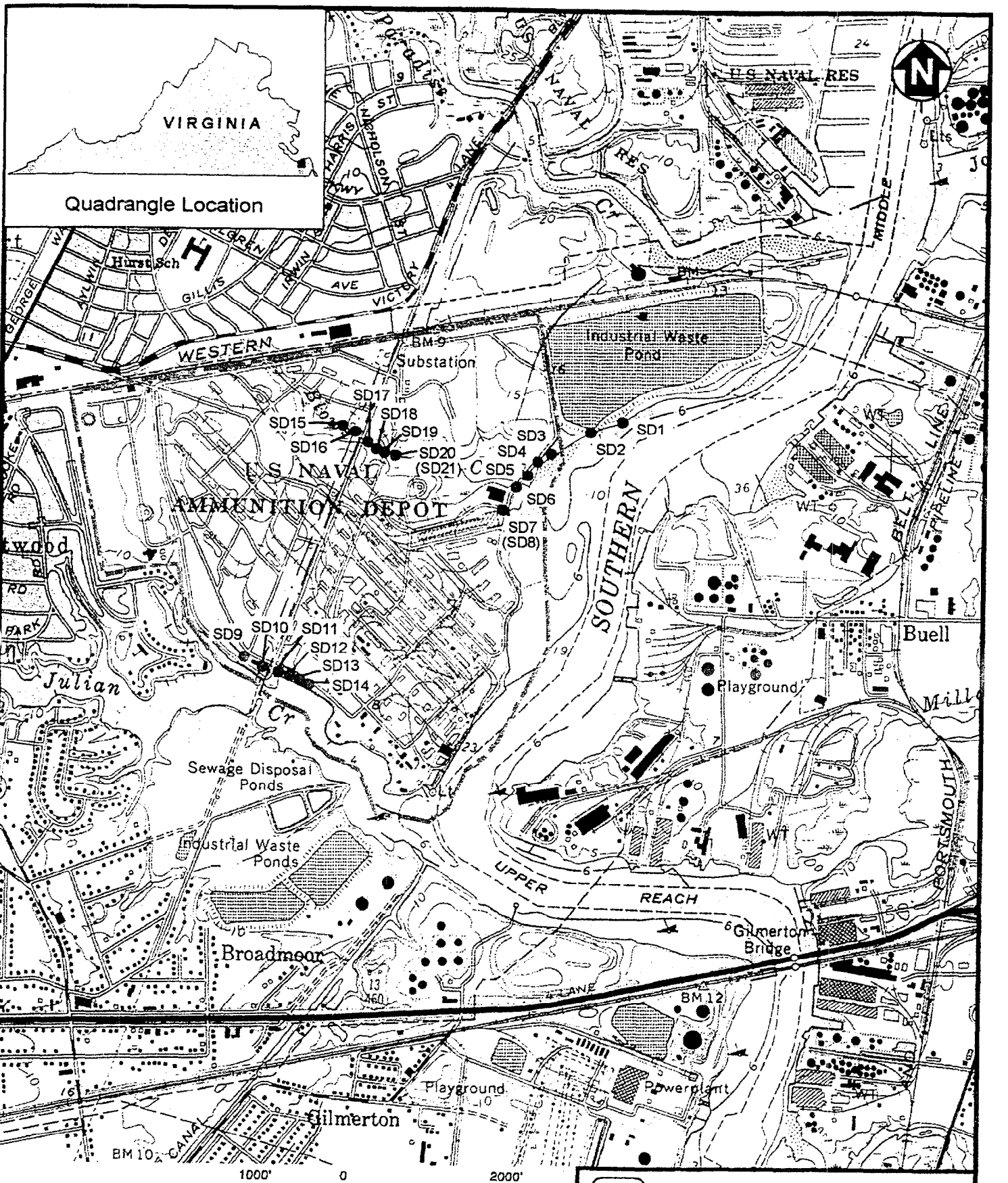
St. Juliens Creek Annex is located in southeastern Virginia at the confluence of St. Juliens Creek and the South Branch of the Elizabeth River in the City of Chesapeake (Figure 1). The northern boundary of the annex is the boundary between the cities of Portsmouth and Chesapeake, Virginia. The Elizabeth River and St. Juliens Creek form the eastern and southern boundaries, respectively, of the annex. Also to the east of the facility is an industrial waste pond, and to the south, sewage disposal and industrial waste ponds and residential developments. A residential section of the city of Portsmouth borders the facility to the west. Norfolk Naval Shipyard is located less than one mile to the north. The Elizabeth River is a segment of the Intercoastal Waterway.

2.2 Site Description

St. Juliens Creek Annex occupies approximately 490 acres, including 407 acres of hard land, 14 acres of marsh, and 69 acres of water surface. The facility is a former ammunitions depot. Railroad tracks run throughout the facility. Blows Creek flows through the facility. Wetlands are located adjacent to both banks of Blows Creek. Numerous landfills, waste disposal areas, and a burning ground have been identified at the facility. Section 2.4 of the plan provides descriptions of potential sources of contamination at the facility.

2.3 Operations

The facility began operating in 1849. Ordnance manufacturing operations and storage of ordnance began at the facility in 1898. Operations at the facility reached a peak during World War II (from 1942 to 1944). The annex's mission during World War II included loading, assembling, issuing, and receiving ammunition for naval guns. The annex also served as the principal experimental and test loading facility for new types of ammunition. Manufacturers' samples of projectiles were loaded and fused for flight, plate, and ballistics tests. Personnel at the facility included 59 Navy officers, 131 United States Marines Corps enlisted personnel, and 4,018 civilians. Mines were loaded 24 hours a day by 1,200 enlisted personnel. Shipments of ammunition and explosives averaged 13,500 tons per month. Outdated ordnance and trash were disposed of in several burn areas within the confines of the annex.



LEGEND

SD10 ● SEDIMENT SAMPLE LOCATION

SITE BOUNDARY

SOURCE: U.S.G.S. Topographic Map Norfolk Spoth, Virginia (1965, Photorevised 1986).

St. Juliens Creek Annex
Chesapeake City, Virginia

FIGURE 1
SITE AND SAMPLE LOCATION MAP

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The St. Juliens Creek Annex also conducted operations unrelated to ordnance operations that generated hazardous waste. Those operations included degreasing and the operation of paint shops, machine shops, vehicle and locomotive maintenance shops, a pest control shop, a battery shop, a print shop, electrical shops, a boiler plant, and washracks. Fire training also was conducted at the annex.

Although numerous concrete magazines are still present, none is used to store ammunitions. St. Juliens Creek Annex is no longer an ammunitions facility. St. Juliens Creek Annex currently provides administrative offices, light industrial shops, and storage facilities for tenant naval commands and is owned by Norfolk Naval Base. Its primary mission is to provide a radar testing range (35 acres) and various other administrative and warehousing structures for the nearby Norfolk Naval Shipyard and other local naval facilities.

Hazardous substances may have been released to the environment from the ordnance manufacturing and testing operations conducted in the past. Releases may have occurred from the following activities:

- Ordnance wastewater and rinse waters were discharged to Blows Creek and the Elizabeth River.
- Rinsate from powder cans "most probably drained" into St. Juliens Creek (A.T. Kearney, Inc. 1989).
- Wastewater from mine loading was discharged into the Elizabeth River or Blows Creek.
- Steam-out condensate was released to the Elizabeth River and Blows Creek.
- Degreasing operations caused releases to a storm drain that terminated at St. Juliens Creek, with constituents of the release including lye, sulfuric acid, and chromic acid.
- From the 1940s through the 1970s, degreasing operations used alodine caustic detergent, methyl ethyl ketone, and acetone, and those waste liquids usually were dumped at the railroad tracks at Building 13.
- Cutting oil used in the machine shop was poured down the storm drain.
- Roads and fence lines were treated with hydraulic fluid and some solvents to kill weeds and control dust.
- Effluent from the washrack drained into a storm drain that emptied into St. Juliens Creek.
- Blasting grit was poured on the soil at Building 47.

Wastes generated by operations at the facility were disposed of both on and off site. Section 2.4 discusses waste disposal areas at the facility or sources that might release contaminants to the groundwater, surface-water, soil, and air pathways.

2.4 Sources

Several sources identified at the St. Juliens Creek Annex may have released contaminants that have had adverse effects on human health or the environment. The following sections describe some of those sources.

2.4.1 Source 1, Landfill B

Landfill B is an unlined landfill located along the southwestern border of the facility, adjacent to the north side of St. Juliens Creek (Figure 2). The area of the landfill, 18,750 square feet, was estimated from figures that show the size of the landfill. From 1921 to 1947, Landfill B was used for the disposal of an estimated 950,000 cubic feet of trash, garbage, acids, and waste ordnance. The refuse was burned on site, and the ash was used to fill in an adjacent swampy area. Neither the size of the swampy area nor whether it is a wetland is known. In 1942, the incinerator at the landfill began operations, and open burning ended. Landfill B closed after 1947 and, since, has become a swampy area covered with brush, trees, and grass. Blast grit from ship overhaul and repair operations also was dumped at the source, although the exact year in which that activity took place is not known. Remnants of the grit have been observed at the source.

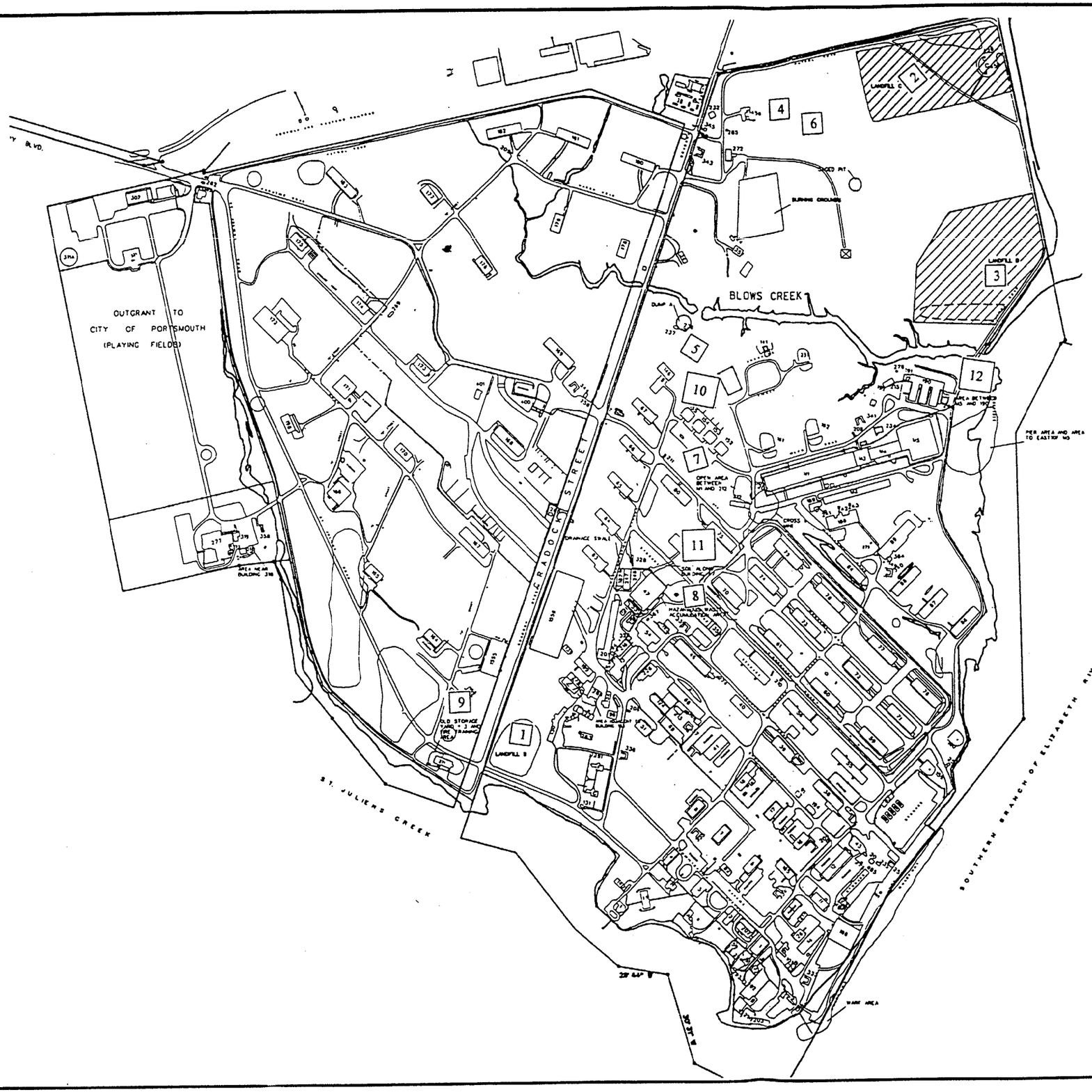
Samples of soil and groundwater were collected from Landfill B in 1996 and 1997. No background samples were collected during the 1996 sampling event; however, background samples were collected during the 1997 sampling event. The analytical data from the 1997 sampling event indicate that surface and subsurface soils at the source are contaminated with metals, volatile organic compounds (VOC), numerous polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB), and pesticides, all at concentrations that exceeded three times the background concentrations. Metals detected in the soil samples at such concentrations were aluminum, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, cyanide, iron, lead, manganese, mercury, nickel, thallium, vanadium, and zinc. VOCs detected at such levels were acetone, methylene chloride, and methyl ethyl ketone. PAHs detected at such levels were benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, fluoranthene, and phenanthrene, while pesticides included 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT. The analytical data from the 1996 sampling event revealed similar concentrations of the contaminants.

In 1997, sediment samples were obtained from a drainage ditch located at the source. Analysis of the samples revealed the presence of metals and pesticides at concentrations more than three times the background levels. Groundwater samples collected from Landfill B were analyzed for metals only. The analysis revealed the presence of the following metals at concentrations three times the background levels: aluminum, arsenic, barium, cadmium, chromium, iron, magnesium, thallium, and vanadium.

Non-sampling data needed to evaluate the potential for Landfill B to release contaminants to the surface water migration pathway include: (1) the size of wetlands within the source, (2) the drainage pattern of the surface-water runoff, and (3) the discharge point of the drainage ditch.

2.4.2 Source 2, Landfill C (Dump C)

Landfill C covers 10 acres in the northeastern corner of the annex. It is accessible by a patrol road (Figure 2). The area originally was a mudflat where refuse was dumped and burned; ash then was used to fill in the area. Neither the size of the mudflat nor whether it is a wetland is known. The landfill is unlined. Landfill operations at the site began in 1940 and continued until 1970. The landfill was graded and covered with grass at an unidentified date, but it has not been closed formally.



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SCALE IN FEET

SOURCE

1 Landfill B
2 Landfill C
3 Landfill D
4 Burning Grounds
5 Dump A
6 Caged Pit at Burning Grounds
7 Cross and Mine
8 Hazardous Waste Disposal Area at Building 53
9 Fire Training Area at Building 271
10 Clearing House Storage Area (DRMO)
11 Blasting Grit at Building 47
12 Residual Ordnance at Building M-5 and 190

St. Juliens Creek Annex
Chesapeake City, Virginia

FIGURE 2
LOCATION OF THE SOURCES

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Refuse disposed of in the landfill included solvents, acids, bases, and mixed municipal waste. The total volume of the trichloroethene (TCE), waste oil, and oil sludge disposed of at this location was estimated to be 750,000 cubic feet before it was burned. Two pits reportedly used for disposal of oils and oily sludges as well as periodic burning, also were located on the landfill. No other information about the sludge pits is available.

Soil and groundwater samples were collected from Landfill C in 1996 and 1997. No background samples were collected during the 1996 sampling event; however, background samples were collected during the 1997 sampling event. The analytical data from the 1997 sampling event indicate that surface and subsurface soils located in the source are contaminated with metals, VOCs, PAHs, PCBs, and pesticides at concentrations that exceed three times the background concentrations. Metals detected in the soil samples at such concentrations were aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, selenium, thallium, and zinc. VOCs detected at such concentrations were acetone and methylene chloride. PAHs detected at such concentrations were benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, bis (2-ethylhexyl) phthalate, chrysene, fluoranthene, indeno (1,2,3-cd) pyrene, phenanthrene, and pyrene. Pesticides detected at such levels were 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT. The analytical data from the 1996 sampling event revealed similar concentrations of the same contaminants.

In 1997, sediment samples were obtained from a drainage ditch located at the source. Analysis of the samples revealed the presence of metals, pesticides, and PCBs at concentrations more than three times the background levels. Groundwater samples collected from Landfill C were analyzed for metals, VOCs, semi-volatile organic compounds (SVOCs), pesticides, and PCBs. The analysis revealed the presence of the following metals at concentrations more than three times the background levels: aluminum, beryllium, chromium, cobalt, copper, lead, manganese, nickel, vanadium, and zinc.

Non-sampling data needed to evaluate the potential for Landfill C to release contaminants to the surface-water migration pathway include: (1) the size of wetlands within the source, (2) the drainage pattern of surface-water runoff, (3) the locations of the drainage ditch discharge point, (4) the boundaries of the source, and (5) the locations and sizes of the two sludge pits.

2.4.3 Source 3, Landfill D

Landfill D covers an estimated five acres, approximately 300 feet south of Landfill C (Figure 2). The source was an unlined trench-and-fill landfill that reportedly operated from 1970 to 1981. The first trench was approximately 1,000 feet long and was located parallel to and 500 feet north of Blows Creek. Soil from subsequent trenches was used to cover previous trenches. The total number of trenches dug into the landfill is not known.

Refuse disposed of in the landfill included drums containing unidentified wastes, domestic garbage, construction materials, solvents, pesticides, acids, bases, and PCBs. It has been reported that drums were stored on the surface of the landfill. Neither the contents nor the number of drums stored at the landfill is known. A dumpster labeled with the words "Asbestos Only" was observed on the landfill. According to personnel at the public works department, fluorescent light ballasts that contained PCBs were disposed of at the landfill. The total volume of wastes disposed of in the landfill is not known.

Soil and groundwater samples were collected from Landfill D in 1996 and 1997. No background samples were collected during the 1996 sampling event; however, background samples were collected during the 1997 sampling event. The analytical data from the 1997 sampling event indicate that surface and subsurface soils located in the source are contaminated with metals, VOCs, numerous PAHs, PCBs, and pesticides at concentrations that exceed three times the background concentrations. Metals detected in the soil samples at such concentrations were: aluminum, antimony, cadmium, chromium, cobalt, copper, nickel, and zinc. VOCs detected at such concentrations were acetone and methyl ethyl ketone (MEK). PAHs detected at such concentrations were bis (2-ethylhexyl) phthalate, fluoranthene, phenanthrene, and pyrene. Pesticides detected at such concentrations were alpha- and gamma-chlordane, 4,4'-DDE, 4,4'-DDT, dieldrin, endrin, endrin aldehyde, and endrin ketone. The analytical data from the 1996 sampling event revealed similar concentrations of the same contaminants.

In 1997, sediment samples were obtained from a drainage ditch located at the source. Analysis of the samples revealed the presence of metals, PAHs, pesticides, and PCBs at concentrations more than three times the background levels. Groundwater samples collected from Landfill D were analyzed for metals, VOCs, SVOCs, pesticides, and PCBs. The analysis revealed the presence of the following metals at concentrations more than three times the background levels: aluminum, antimony, arsenic, barium, beryllium, cobalt, copper, iron, lead, manganese, nickel, selenium, thallium, vanadium, and zinc.

Non-sampling data needed to evaluate the potential for Landfill D to release contaminants to the surface-water migration pathway include: (1) the drainage patterns of surface-water runoff, (2) the locations of drainage structures and the locations to which they discharge, and (3) the locations and sizes of wetlands within the landfill.

2.4.4 Source 4, Burning Grounds

The burning grounds are located off Craddock Street in the northern part of the facility (Figure 2). The source currently consists of an open field with areas overgrown with tall reeds. The exact dates of the beginning of operations at the burning grounds and its closure are unknown, although the source is believed to have operated from the 1930s to the 1970s. The area of the burning grounds is estimated from figures of the source to be 22,525 square feet. In 1977, the surface area was burned with oil and straw, diced, and burned again, in an effort to decontaminate the soil.

Wastes disposed of at the burning grounds included ordnance materials, such as black powder, smokeless powder, explosive D, Composition A-3, tetryl, trinitrotoluene, and fuses. Other materials disposed of there included carbon tetrachloride, TCE, paint sludges, pesticides, and various types of refuse.

Soil and groundwater samples were collected from the burning grounds in 1996 and 1997. No background samples were collected during the 1996 sampling event; however, background samples were collected during the 1997 sampling event. The analytical data from the 1997 sampling event indicate that surface and subsurface soils located in the source are contaminated with metals, VOCs, numerous PAHs, dioxin, and pesticides at concentrations that exceed three times the background levels. Metals detected in the soil samples at such concentrations were arsenic, cobalt, cyanide, and nickel. VOCs detected at such concentrations were acetone and methyl ethyl ketone. PAHs detected at such concentrations were benzo(a)fluoranthene, benzo(k)fluoranthene, bis (2-ethylhexyl) phthalate, chrysene, di-n-butyl phthalate, fluoranthene, indeno (1,2,3-cd) pyrene, n-nitroso-di-n-propylamine, and pyrene, while pesticides

detected included 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, and dieldrin. The analytical data from the 1996 sampling event revealed similar concentrations of the contaminants.

In 1997, sediment samples were obtained from a drainage ditch located at the source. Analysis of the samples revealed the presence of endrin aldehyde, cyanide, and dieldrin at concentrations more than three times the background levels. Groundwater samples collected from the burning grounds were analyzed for metals, VOCs, SVOCs, pesticides, and PCBs. The analysis revealed the presence of the following metals at concentrations more than three times the background levels: aluminum, antimony, arsenic, beryllium, chromium, cobalt, copper, iron, lead, manganese, nickel, and vanadium.

Non-sampling data needed to evaluate the potential for the burning grounds to release contaminants to the surface-water migration pathway include: (1) the drainage pattern of surface-water runoff, (2) the locations of drainage structures and the locations to which they discharge, and (3) the locations and sizes of wetlands within the landfill.

2.4.5 Source 5, Dump A

The landfill known as Dump A encompasses one acre along a southern section of Blows Creek, east of the Virginia Power Company (Vepco) right-of-way and west of railroad tracks in the area (Figure 2). Dump A was used from 1921 to 1924 for the disposal of organics and inorganic chemicals, pesticides, acids, bases, and mixed municipal wastes. It has been reported that the waste was burned and the ashes used to fill a marsh area at Dump A that extends to Blows Creek. The burn area and disposal area for the ash reportedly were located at the same site. Most of the wastes were burned. An estimated 30,000 cubic feet of waste were disposed of at the source.

Soil and groundwater samples were collected from Dump A in 1996. No background samples were collected; however, the analytical data indicate that surface soils located in the source are contaminated with numerous PAHs and pesticides. The contaminants detected include benzo(b)fluoranthene; benzo(k)fluoranthene; chrysene; fluoranthene; 4,4'-DDE; and 4,4'-DDT.

Non-sampling data needed to evaluate the potential for Dump A to release contaminants to the surface-water migration pathway include: (1) the drainage pattern of surface-water runoff, (2) the locations of drainage structures and the locations to which they discharge, (3) the locations and sizes of wetlands in the dump, and (4) the results of analysis of background soil samples obtained during previous investigations.

2.4.6 Source 6, Caged Pit at Burning Grounds (Small Items Pit)

The small items pit located in the burning grounds (Source 4) was used for burning igniters and fuses (Figure 2). The size of the source and the period of time during which the source was used are not known. During the Resource Conservation and Recovery Act (RCRA) facility assessment conducted in 1989, the source could not be located. Soil samples were collected from the source in 1996. Although no background samples were collected, the soil samples revealed numerous PAHs, including benzo (a) anthracene, benzo (a) pyrene, benzo (b) fluoranthene, benzo (g,h,i) perylene, benzo (k)fluoranthene, chrysene, fluoranthene, phenanthrene, and pyrene. No other information about this source is available.

2.4.7 Source 7, Cross and Mine

This source is located in an area adjacent to Building 212, across the street from Building M-1 in the vicinity of Cross Street and Mine Road (Figure 2). The source, which is approximately 20,000 square feet in size, was used as a disposal area for rinse water from spray tanks. The spray tanks contained either herbicides or insecticides. Rinse water from cleaning the tanks was discharged to the surface of the ground and allowed to filter into the soil. The source operated from approximately the early 1950s to the mid-1960s; during that time, an estimated 675,000 gallons of rinse water was disposed of. In the 1980s, the source was observed to be void of vegetation. Currently, the area is covered with grass.

Soil samples obtained from the source in 1996 revealed the presence of 4,4'-DDD; 4,4'-DDE, and 4,4'-DDT. No background soil sample was collected for the source.

2.4.8 Source 8, Hazardous Waste Disposal Area at Building 53

The hazardous waste disposal area at Building 53 reportedly was used for the disposal of waste solvents, including TCE and possibly PCBs, onto the ground adjacent to the building (Figure 2). Neither the quantity of waste disposed nor the size of the source is known. Soil samples were collected from the source in 1996. Contaminants detected in the soil samples were 4,4'-DDE, 4,4'-DDT, dieldrin, endrin, mercury, and PCBs. No background soil sample was collected for the source.

2.4.9 Source 9, Fire Training Area at Building 271

This source, which is located adjacent to Building 271, consists of two adjacent areas that are used to train personnel to fight fires (Figure 2). No description of the areas is included in the documents reviewed. However, one of the areas consists of a burning site where wooden pallets were soaked with diesel fuel and ignited; the fire then was extinguished with water. The other burning site is a stainless steel pit (4 feet by 4 feet by 3 feet) that was filled with diesel fuel and ignited; the fire then was extinguished with carbon dioxide. Soil samples collected from the source revealed the presence of metals, PAHs, and pesticides. The contaminants present include barium; bis (2-ethylhexyl) phthalate; copper; 4,4'-DDD; 4,4'-DDE; 4,4'-DDT; iron; mercury; 2-methylnapthalene; and vanadium. No background soil sample was collected for the source. No other information about the source is available.

Non-sampling data needed to evaluate the potential for the fire training area to release contaminants to the surface water migration pathway include: (1) the drainage pattern of surface-water runoff and (2) the locations and discharge points of drainage ditches.

2.4.10 Source 10, Clearing House Storage Area (Storage Yard)

This source is located about 400 feet south of Blows Creek, to the east of Craddock Street (Figure 2). It was used as a clearing house for items that the government had deemed to be in excess. The area of the source is approximately 10 acres. Items stored there included scrap metal, obsolete equipment, and salvaged material. A warehouse located in the area was used to store such excess items as computers, copiers, and other types of electrical equipment. Oil stains have been observed in the source area.

In 1996, soil samples were collected from the source. Analysis of the samples revealed the presence of barium, copper, dieldrin, endrin, iron, lead, mercury, and PCBs. No background soil sample was collected for the source.

Non-sampling data needed to evaluate the potential for the clearing house storage area to release contaminants to the surface-water migration pathway include: (1) the drainage pattern of surface water runoff and (2) the locations and discharge points of drainage structures.

2.4.11 Source 11, Blasting Grit at Building 47

This source included an area in which small amounts, less than five gallons, of black blasting grit were poured on the soil along the south end of Building 47 (Figure 2). The source of the blasting grit is not known, although there were two sand-blasting booths in Building 47. Personnel who worked in Building 47 have stated that black blasting grit never was used in these sand blasters.

Analytical data from soil samples obtained from this source in 1996 revealed the presence of arsenic, barium, benzo(a)pyrene, copper, lead, mercury, and pyrene. No background sample was collected for the source.

Non-sampling data needed to evaluate the potential for the blasting grit at Building 47 to release contaminants to the surface-water migration pathway include: (1) a description of the soil samples collected from the source and (2) the analysis of a background soil sample.

2.4.12 Source 12, Residual Ordnance at Buildings M-5 and 190 (Wharf Area Building M-5)

This source includes an area between Building M-5 and Building 190 where various ordnance items were disposed (Figure 2). No other information about this source is available. Analysis of soil samples collected from the area in 1996 revealed the presence of antimony; arsenic; barium; cadmium; chromium; copper; 4,4'-DDD; iron; lead; mercury; and PCBs. No background soil sample was obtained from this source.

Non-sampling data needed to evaluate the potential for the residual ordnance at buildings M-5 and 190 to release contaminants to the surface-water migration pathway include: (1) the drainage pattern of surface water runoff, (2) the locations of drainage structures and the locations to which they discharge, (3) identification of the potential source of PCBs, and (4) a description of the operations conducted at the source.

3.0 PROJECT DESCRIPTION

3.1 Objective and Data Use

Previous sampling of source areas revealed significant concentrations of metals (including aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, cyanide, lead, manganese, mercury, nickel, selenium, thallium, vanadium, and zinc), VOCs, PAHs, pesticides, and PCBs. The objective of the planned sampling event is to determine whether the source areas have released hazardous substances to the receiving surface water bodies. Sediment samples therefore will be collected from Blows Creek, St. Juliens Creek, and the Elizabeth River and will be analyzed for target analyte list (TAL) (metals) and target compound list (TCL) constituents. The data obtained during the sampling event will be used to determine whether hazardous substances at the sources at the annex have been released to the surface-water migration pathway. Non-sampling data, such as the drainage pattern of surface-water runoff from the sources to surface water will also be collected to determine the potential of the sources to release contaminants to the surface-water migration pathway.

3.2 Scope of Work

The scope of work for this sampling event includes the collection of sediment samples from Blows Creek, St. Juliens Creek, and the Elizabeth River and the collection of non-sampling data that is described in Section 2.0. Meetings with representatives of the facility will be held to discuss available data and health and safety issues. Copies of investigations conducted at the facility, currently not available in the U.S. Environmental Protection Agency (EPA) facility files, will be obtained. Table 1 lists a summary of the sample locations, which are shown in Figure 1. Table 2 provides a summary of the total number of samples to be collected and the analyses to be performed.

A total of 19 sediment samples will be collected and analyzed for TAL and TCL constituents. Two background sediment samples each will be collected from Blows Creek, the Elizabeth River, and St. Juliens Creek, for a total of six background sediment samples. A limited number of aqueous surface water or leachate samples may also be taken, as determined in the field.

TABLE 1
ST. JULIENS CREEK ANNEX SAMPLING DATA SUMMARY

Sample Identifier	Matrix	Type of Sample	Location	Rationale
SD-1	Sediment	Composite (0 to 2 inches bgs)	Downstream of St. Juliens Creek Annex in the Elizabeth River, in the area of the industrial waste pond. The exact location to be identified in the field.	To determine whether Source 3 has released hazardous substances to the Elizabeth River.
SD-2	Sediment	Composite (0 to 2 inches bgs)	Downstream of St. Juliens Creek Annex in the Elizabeth River, approximately 500 feet upstream of SD-1. The exact location to be identified in the field.	To determine whether Source 3 has released hazardous substances to the Elizabeth River.
SD-3	Sediment	Composite (0 to 2 inches bgs)	Adjacent to the St. Juliens Creek Annex in the Elizabeth River, approximately 500 feet upstream of SD-2. The exact location to be identified in the field.	To determine whether Source 3 and Blows Creek has released hazardous substances to the Elizabeth River.
SD-4	Sediment	Composite (0 to 2 inches bgs)	Adjacent to the St. Juliens Creek Annex in the Elizabeth River, approximately 500 feet upstream of SD-3. The exact location to be identified in the field.	To determine whether Source 3 and Blows Creek has released hazardous substances to the Elizabeth River.
SD-5	Sediment	Composite (0 to 2 inches bgs)	Adjacent to the St. Juliens Creek Annex in the Elizabeth River, approximately 100 feet downstream of Blows Creek. The exact location to be identified in the field.	To determine whether Blows Creek is releasing hazardous substances to the Elizabeth River.
SD-6	Sediment	Composite (0 to 2 inches bgs)	Adjacent to the St. Juliens Creek Annex in the Elizabeth River, approximately 100 feet upstream of Blows Creek. The exact location to be identified in the field.	To determine whether Blows Creek is releasing hazardous substances to the Elizabeth River and to establish background concentrations in the Elizabeth River.
SD-7	Sediment	Composite (0 to 2 inches bgs)	Adjacent to the St Juliens Creek Annex in the Elizabeth River, approximately 300 feet upstream of Blows Creek. The exact location to be identified in the field.	To determine whether Blows Creek is releasing hazardous substances to the Elizabeth River and to establish background concentrations in the Elizabeth River.

bgs = below ground surface

TABLE 1
ST. JULIENS CREEK ANNEX SAMPLING DATA SUMMARY (Cont.)

Sample Identifier	Matrix	Type of Sample	Location	Rationale
SD-8	Sediment	Composite (0 to 2 inches bgs)	Adjacent to the St Juliens Creek Annex in the Elizabeth River, approximately 300 feet upstream of Blows Creek. The exact location to be identified in the field.	Duplicate of SD-7 for quality assurance and quality control (QA/QC).
SD-9	Sediment	Composite (0 to 2 inches bgs)	Adjacent to the St Juliens Creek Annex in St. Juliens Creek, approximately 800 feet upstream of the right-of-way and the center road that transects St. Juliens Creek Annex. The exact location to be identified in the field.	To establish background concentrations in St. Juliens Creek.
SD-10	Sediment	Composite (0 to 2 inches bgs)	Adjacent to the St Juliens Creek Annex in St. Juliens Creek, approximately 500 feet upstream of the right-of-way and the center road that transects St. Juliens Creek Annex. The exact location to be identified in the field.	To establish background concentrations in St. Juliens Creek.
SD-11	Sediment	Composite (0 to 2 inches bgs)	Adjacent to the St Juliens Creek Annex in St. Juliens Creek, approximately 500 feet downstream of the right-of-way and the center road that transects St. Juliens Creek Annex. The exact location to be identified in the field.	To determine whether Sources 1 and 9 has released hazardous substances to St. Juliens Creek.
SD-12	Sediment	Composite (0 to 2 inches bgs)	Adjacent to the St Juliens Creek Annex in St. Juliens Creek, approximately 500 feet downstream of SD-11. The exact location to be identified in the field.	To determine whether Sources 1 and 9 has released hazardous substances to St. Juliens Creek.

bgs = below ground surface

TABLE 1
ST. JULIENS CREEK ANNEX SAMPLING DATA SUMMARY (Cont.)

Sample Identifier	Matrix	Type of Sample	Location	Rationale
SD-13	Sediment	Composite (1 to 2 inches bgs)	Adjacent to the St Juliens Creek Annex in St. Juliens Creek, approximately 500 feet downstream of SD-12. The exact location to be identified in the field.	To determine whether Sources 1 and 9 released hazardous substances to St. Juliens Creek.
SD-14	Sediment	Composite (0 to 2 inches bgs)	Adjacent to the St Juliens Creek Annex in St. Juliens Creek, approximately 500 feet downstream of SD-13. The exact location to be identified in the field.	To determine whether Sources 1 and 9 has released hazardous substances to St. Juliens Creek.
SD-15	Sediment	Composite (0 to 2 inches bgs)	Blows Creek, approximately 800 feet upstream of the right-of-way and the center road that transects St. Juliens Creek Annex. The exact location to be identified in the field.	To establish background concentrations in Blows Creek.
SD-16	Sediment	Composite (0 to 2 inches bgs)	Blows Creek, approximately 500 feet upstream of the right-of-way and the center road that transects St. Juliens Creek Annex. The exact location to be identified in the field.	To establish background concentrations in Blows Creek.
SD-17	Sediment	Composite (0 to 2 inches bgs)	Blows Creek, approximately 500 feet downstream of the right-of-way and the center road that transects St. Juliens Creek Annex. The exact location to be identified in the field.	To document an observed release to surface water from Sources 3 and 5.
SD-18	Sediment	Composite (0 to 2 inches bgs)	Blows Creek, approximately 500 feet downstream of SD-17. The exact location to be identified in the field.	To document an observed release to surface water from Sources 3 and 5.
SD-19	Sediment	Composite (0 to 2 inches bgs)	Blows Creek, approximately 500 feet downstream of SD-18. The exact location to be identified in the field.	To document an observed release to surface water from Sources 3 and 5.

bgs = below ground surface

TABLE 1
ST. JULIENS CREEK ANNEX SAMPLING DATA SUMMARY (Cont.)

Sample Identifier	Matrix	Type of Sample	Location	Rationale
SD-20	Sediment	Composite (0 to 2 inches bgs)	Blows Creek, approximately 500 feet downstream of SD-19. The exact location to be identified in the field.	To document an observed release to surface water from Sources 3 and 5.
SD-21	Sediment	Composite (0 to 2 inches bgs)	Blows Creek, approximately 500 feet downstream of SD-19. The exact location to be identified in the field.	Duplicate of SD-20 for QA/QC.
SD-22	Sediment	Composite (0 to 2 inches bgs)	Elizabeth River. To be identified in the field.	To establish background concentrations in the Elizabeth River.
SD-23	Sediment	Composite (0 to 2 inches bgs)	Elizabeth River. To be identified in the field.	To establish background concentrations in the Elizabeth River.
Aqueous	Surface Water or Leachate	Grab	To be identified in the field.	To determine whether sources on the facility are releasing hazardous substances to surface water.
RB-1	Water	Blank - water	Rinsate blank	QA/QC
FB-1	Water	Blank - water	Field blank	QA/QC
TB-1	Water	Blank - water	Trip blank	QA/QC

bgs = below ground surface

TABLE 2
ST. JULIENS CREEK ANNEX - TOTAL NUMBER OF SAMPLES TO BE COLLECTED

Sample Location	Number of Samples	Analysis
Elizabeth River	10	TAL and TCL CLP SOW
Blows Creek	7	TAL and TCL CLP SOW
St. Juliens Creek	6	TAL and TCL CLP SOW
Aqueous	10	TAL and TCL CLP SOW
Duplicates	2	TAL and TCL CLP SOW
Matrix Spike/Matrix Spike Duplicate	1	TAL and TCL CLP SOW
Blanks (rinsate and field)	2	TAL and TCL CLP SOW
Blank (trip)	1	VOC Analysis CLP SOW
	26	TAL CLP SOW
	26	TCL CLP SOW
	1	VOCs CLP SOW

Notes:

CLP SOW Contract Laboratory Procedure Scope of Work

4.0 SAMPLING PROCEDURES

4.1 Sediment Sampling

All sampling activities will be conducted in accordance with Region 3 Site Assessment and Technical Assistance (SATA) Generic Field Sampling Plan for Pre-Remedial Site Assessment Activities. Sediment samples will be collected at depths of less than 2 inches from the surface. Each sample will be analyzed for TAL and TCL constituents. Samples will be collected with a clean stainless steel scoop or a steel auger, placed in a stainless steel bowl, composited, and then placed into the appropriate sample container. Table 3 summarizes the appropriate bottle sizes and preservatives for each analysis.

Sampling equipment will be decontaminated between sample locations with a solution of Alconox® and water, rinsed with deionized water, and allowed to air dry.

4.2 Sample and Equipment Decontamination of Containers

Sample containers that have no visible contamination on the outside will be wiped with paper towels before they are placed in plastic bags. Sample containers that have visible contamination on the outside will be decontaminated with a solution of Alconox® and water, rinsed with deionized water, and dried with paper towels before they are placed in plastic bags.

Disposable sampling equipment will be double-bagged and disposed of as dry industrial waste. Augers and other stainless steel sampling equipment will be decontaminated with a solution of Alconox® and water, rinsed with deionized water, and allowed to air dry.

5.0 ANALYTICAL PARAMETERS

Listed below are the sample analyses requested by matrix and the sampling containers, preservatives, and analytical methods to be used.

TABLE 3
SUMMARY OF ANALYTICAL PARAMETERS,
APPROPRIATE CONTAINERS, AND PRESERVATIVES

Sample Location	Matrix	Analytical Parameter	Test Method	Containers and Preservatives
All samples from Blows Creek, Elizabeth River, and St. Juliens Creek.	Sediment	TAL Metals	CLP SOW	One 8-ounce glass jars
All samples from Blows Creek, Elizabeth River, and St. Juliens Creek.	Sediment	TCL Constituents	CLP SOW	One 8-ounce or two 4-ounce glass jars
Trip Blank	Water	VOCs	CLP SOW	3-40 ml VOA vials
Rinsate and field blank Aqueous Samples	Water	TCL Constituents TAL Metals	CLP SOW CLP SOW	4-1-liter amber 3-40 ml VOA vials with hydrochloride acid 1 1-liter poly with nitric acid 1-1-liter poly with sodium hydroxide

Notes:

ml Milliliter
VOC Volatile Organic Compound

6.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) PROCEDURES

6.1 Quality Control of Field Activities

The SATA site leader will be responsible for ensuring that sample quality and integrity of samples are maintained in accordance with the QA/QC (Quality Assurance and Quality Control) Control Guidance for Removal Activities, EPA/540/G-90/004, April 1990, and that sampling and documentation procedures are carried out as described in Section 6.3 of this sampling plan.

6.2 Sample Packaging and Storage

Sample containers will be labeled and placed in plastic bags. Bagged containers will be placed in appropriate transport containers, and the containers will be packed with appropriate absorbent material, such as vermiculite, and preserved with ice, if necessary. All sample documents will be affixed to the underside of the lid of each transport container. The lid will be sealed with shipping tape, and custody seals will be affixed to the transport container. Transport containers will be labeled with the place of origin and destination.

Regulations for packaging, marking, labeling, and shipping of hazardous materials and wastes are promulgated by the U.S. Department of Transportation (DOT). Air carriers that transport hazardous materials, in particular, FedEx, require compliance with the current regulations of the International Air Transport Association (IATA), which apply to the shipment and transport of hazardous material by air carrier. IATA regulations will be complied with in shipping the samples.

6.3 Field Quality Control

Field quality control will consist of the collection of field duplicate samples and rinsate, field, and trip blanks and documentation of the samples. Analysis of the field duplicate samples will test the reproducibility of sampling procedures and results. One rinsate blank will be collected to verify the effectiveness of the decontamination procedure used for the auger and scoop.

6.4 Laboratory Quality Control

Laboratory QC will consist of documentation of all QC procedures set forth in the CLP SOW, as well as submittal of all forms and deliverables required under the SOW. Matrix spike and matrix spike duplicate (MS/MSD) samples will be collected for the TAL and TCL analysis. For each analysis, one MS/MSD sample will be designated for every 20 samples collected.

6.5 Data Validation

SATA team members will perform data validation, using the EPA guidance National Functional Guidelines for Organic and Inorganic Data Review. A data quality report will be prepared to summarize the data validation activity and to present any concerns related to data quality.

7.0 REPORTS

Information gathered through the sampling event will be compiled into a trip report. The report will discuss data collection methods and sample locations and will present data summary tables, maps, diagrams, and a data quality report. The trip report will be submitted to EPA after the analytical data have been received and the data validation completed. The report will be submitted two weeks after the data validation is completed.

8.0 REFERENCES

A.T. Kearney, Inc. 1989. Phase II RCRA Facility Assessment of the St. Juliens Creek Annex Facility, Chesapeake, Virginia. March.

CDM Federal Programs Corporation. 1997. Draft Analytical Data Summary Tables and Sample Location Maps, St. Juliens Creek Annex, Chesapeake, Virginia. October 3.

CH2MHILL. 1997. Remedial Investigation and Feasibility Study, Landfill C (Site 3) and Landfill D (Site 4), St. Juliens Creek Annex, Chesapeake, Virginia. May.

CH2MHILL. 1997. Remedial Investigation and Feasibility Study, Landfill 4 (Site 2) and Burning Grounds (Site 5), St. Juliens Creek Annex, Chesapeake, Virginia. May.